



Oct. 9, 2002

Mike Ribardy  
United States Environmental  
Protection Agency *SR-6J*  
77 W. Jackson Blvd. (~~SE-5J~~)  
Chicago, Illinois 60604

Dear Sir:

We are submitting the following Initial Release Public Health  
Assessment for your review:

*Sanget Area 1*

Please review this document for any major technical or factual  
errors or omissions. Should you have any comments, please submit  
them to us, in writing, for review and transmittal to the  
appropriate state health department representative.

Please return the review comments back to ATSDR within 30 days.  
Should you have problems meeting this schedule, please let us  
know that there will be a delay.

If you have any concerns, please feel free to call us at 886-  
0840. We look forward to making this a helpful and useful  
document.

Sincerely,

*Mark D. Johnson*  
Mark D. Johnson  
Senior Regional Representative  
ATSDR - Region 5

pg:ATSDR:1/93

# Public Health Assessment for

SAUGET AREA I - EPA FACILITY ID: ILD980792006  
SAUGET AREA I - DEAD CREEK AREA G (SAUGET I) - EPA FACILITY ID: ILD981953623  
SAUGET AREA I - DEAD CREEK SEGMENT A - EPA FACILITY ID: ILD984809277

SAUGET, ST. CLAIR COUNTY, ILLINOIS

SEPTEMBER 24, 2002

**DEPARTMENT OF HEALTH & HUMAN SERVICES**  
**Public Health Service**  
**Agency for Toxic Substances and Disease Registry**

**Comment Period Ends:**

**NOVEMBER 04, 2002**



## THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104 (i) (7) (A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall **include** preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such **factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure.** The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations and studies **available from the Administrator of EPA.**"

In accordance with the CERCLA section cited, **ATSDR has conducted** this preliminary health assessment on the data in the site summary form. Additional public health assessments **may be conducted** for this site as more information becomes available to ATSDR.

The conclusions and recommendations presented in **this public health assessment** are the results of site-specific analyses and are not to be cited or quoted in other evaluations or **public health assessments.**

Use of trade names is for identification only and **does not constitute endorsement** by the Public Health Service or the U.S. Department of Health and Human Services.

**PUBLIC HEALTH ASSESSMENT**

**SAUGET AREA I - EPA FACILITY ID: ILD980792006**

**SAUGET AREA I - DEAD CREEK AREA G (SAUGET I) - EPA FACILITY ID: ILD981953623**

**SAUGET AREA I - DEAD CREEK SEGMENT A - EPA FACILITY ID: ILD984809277**

**SAUGET, ST. CLAIR COUNTY, ILLINOIS**

**Prepared by:**

**Illinois Department of Public Health  
Under a Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry**

## FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. The public health assessment program allows the scientists flexibility in the format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document or it could be a compilation of several health consultations the structure may vary from site to site. Nevertheless, the public health assessment process is not considered complete until the public health issues at the site are addressed.

**Exposure:** As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

**Health Effects:** If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The health impacts to other high risk groups within the community (such as the elderly, chronically ill, and people engaging in high risk practices) also receive special attention during the evaluation.

ATSDR uses existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries, to determine the health effects that may result from exposures. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further public health actions are needed.

**Conclusions:** The report presents conclusions about the public health threat, if any, posed by a site. When health threats have been determined for high risk groups (such as children, elderly, chronically ill, and people engaging in high risk practices), they will be summarized in the conclusion section of the report. Ways to stop or reduce exposure will then be recommended in the public health action plan.

ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, fullscale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

**Interactive Process:** The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

**Community:** ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

**Comments:** If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E60), Atlanta, GA 30333.

## Table of Contents

Summary .....	1
Purpose .....	2
Background .....	2
Location and History .....	2
Demographics .....	4
Discussion .....	6
Chemicals of Interest .....	6
Exposure Analysis .....	8
Completed Exposure Pathways .....	8
Potential Exposure Pathways .....	10
Toxicological Evaluation .....	10
Community Health Concerns .....	11
Child Health Initiative .....	12
Conclusions .....	12
Recommendations and Public Health Action Plan .....	13
Preparers of Report .....	13
References .....	14
Tables .....	15
Attachments .....	28
Figures .....	32

## Summary

Sauget Area 1 is a proposed National Priorities List site. As a result, the Illinois Department of Public Health (IDPH) has prepared this public health assessment, which evaluates the various sites of Sauget Area 1, including Dead Creek. In May 1995, The Agency for Toxic Substances and Disease Registry (ATSDR) issued a health consultation prepared by IDPH for Sauget Area 1. This current public health assessment will address activities since the 1995 health consultation.

The Area 1 Sauget Sites consist of Sites G, H, I, L, M, N, and Dead Creek. Sites G, H, I were borrow pits that were later filled with a variety of wastes including chemicals. Site L was a holding pond for the wash water from cleaning hazardous waste hauling trucks. Site M is a borrow pit that filled with water. Site N is an excavated area that is partly filled with construction debris. Dead Creek stretches from Site I at Creek Segment A (CS-A) and flows south through Sauget and Cahokia before draining into the Old Prairie DuPont spillway and then into the Mississippi River.

IDPH concludes that Sauget Sites Area 1, in Sauget, Illinois, poses a public health hazard because long-term exposure to ambient air and eating fish from Borrow Pit Lake could result in adverse health effects. The source of dioxins, 1,1-dichloroethene, and methylene chloride in ambient air is presently not known. Results from sampling and analysis of fish before the remediation of Borrow Pit Lake sediments suggests the possibility of developmental health effects in children who routinely eat contaminated fish. These were the only fish contaminant data available at the time this public health assessment was written, and this information may not reflect current conditions.

Prior to remediation of creek sediments and the fencing of some sites, exposure to elevated levels of some contaminants may have occurred. Exposure to site-related chemicals in surface water, sediments, and soil would not be expected to result in adverse health effects.

IDPH recommends that additional air and fish sampling be conducted and that the responsible parties maintain restricted access to Creek Segment B and Site M.



## **Purpose**

The Sauget Area 1 site was proposed for addition to the National Priorities List on September 13, 2001. In May 1995, the Agency for Toxic Substances and Disease Registry (ATSDR) issued a health consultation prepared by the Illinois Department of Public Health (IDPH) for Sauget Area 1. The conclusions and recommendations of that health consultation can be found in Attachment 1. This public health assessment will address site sampling and activities that have occurred since the 1995 health consultation.

## **Background**

### **Location and History**

Sauget is in St. Clair County, Illinois south of East St. Louis and across the Mississippi River from St. Louis, Missouri. Sauget is surrounded by several large industries and has many areas of environmental contamination. These contaminated areas are collectively known as the Sauget Sites. The Sauget Sites are divided into two areas, Area 1 and Area 2. The general dividing line between Areas 1 and 2 is Illinois Route 3, with all sites east of Route 3 belonging to Area 1 and those to the west, except Dead Creek Segment F, in Area 2 (Figure 1).

The separate sites in Sauget Area 1 are designated by letters. Dead Creek runs through Area 1, and has been divided into six segments. Information about each of these sites is provided below.

### **Site G**

Site G is in Sauget and is bordered by Queeny Avenue to the north, Dead Creek to the east, a cultivated field to the south, and Wiese Engineering to the west. Site G was a subsurface disposal area that covered approximately 5 acres (Figure 2).

The chain-link fence around Site G was originally constructed in May 1987 in response to high levels of volatile organic chemicals (VOCs) in surface soils. In 1995, the U.S. Environmental Protection Agency (USEPA) removed surface wastes and soils, solidified open oil pits, and covered part of the site with a soil cap (1). The depth of the soil cap varies from 1.5 to 2 feet.

### **Site H**

Site H was also a subsurface disposal area in Sauget just south and west of the intersection of Queeny Avenue and Falling Springs Road. The site covers approximately 5 acres (Figure 2). At one time, the site was connected to Site I. Presently, Site H is level and vegetated. Drainage is toward Dead Creek, which is west of the site. Access to this site is not restricted.

**Site I**

Site I covers approximately 20 acres on the eastern side of the Cerro Copper Products property (Figure 2). The site is just north and east of the intersection of Queeny Avenue and Falling Springs Road in Sauget. Site I runs along the eastern border of Creek Segment A and was the site of a sand and gravel borrow pit. The pit was filled and then covered and graded. A chain-link fence and a guard at the main gate restrict access to the site.

**Site L**

Site L is a former surface impoundment used to dispose of rinse water from truck cleaning operations of a hazardous waste hauler (Figure 2). The impoundment was about 70 feet by 150 feet in size and was 500 feet south of Queeny Avenue and approximately 125 feet east of Dead Creek in Cahokia. The site is level, covered with black cinders, and is being used to store heavy equipment. Access to the site is not restricted.

**Site M**

Site M is a pit just east of Dead Creek Segment B, approximately 300 feet north of Judith Lane (Figure 2). Site M is a borrow pit that was excavated in the 1940s by H. H. Hall Construction (3). It is approximately 275 feet by 350 feet in size and is 40 feet deep. It is filled with water and is connected to Dead Creek Segment B by a drainage way that is approximately 8 feet wide. Site M has no visible signs of chemical dumping. It is surrounded by a chain-linked fence that also encompasses Dead Creek Segment B.

**Site N**

Site N was a borrow pit in the 1940s and was filled with concrete rubble, scrap wood, and other demolition debris (1). The site covers about 5 acres and is west of Dead Creek Segment C, east of Falling Springs Road, north of Judith Lane, and south of Edwards Street (Figure 2) (4). Site N is no longer in use and is fenced.

**Dead Creek Segments A, B, C, D, E, and F**

Dead Creek Segment A (CS-A) is due west of Site I on Cerro Copper Products property in Sauget (Figure 2). No wastes are currently being discharged into CS-A, although the waste is discolored and oily, presumably from past discharges. CS-A no longer discharges to the lower segments of the creek due to the blocking of a culvert under Queeny Avenue in the 1970s. Cerro Copper remediated CS-A in 1990 and 1991.

Creek Segment B (CS-B) is just south of CS-A between Queeny Avenue and Judith Lane. Figure 3 shows the features of CS-B. Part of CS-B is in Sauget and the other part is in Cahokia. The culverts at both Queeny Avenue and Judith Lane have been blocked to prevent the contamination

in the creek from flowing into the southern portion of the creek. A chain-link fence that USEPA originally installed in 1982 encompasses CS-B. CS-B was remediated in 2001.

Dead Creek Segments C through F are those portions of the creek south of Judith Lane. These segments run through Cahokia, a wetland called Borrow Pit Lake, and empties into the Prairie DuPont Floodway. The floodway then discharges to the Mississippi River. The creek is wider in these sections than it is in CS-B. In the southern section of CS-D, the Parks College area, the creek runs underground through corrugated pipe. It resurfaces briefly at the intersection of Route 157 and Falling Springs Road, turns west through a series of culverts, and drains into a wetland area west of Route 3. Access to these sections of the creek are unrestricted and it runs through residential areas. Creek segments C, D, E, and F were remediated in 2001.

### **1995 Sauget Area 1 Health Consultation**

On May 8, 1995, ATSDR issued a health consultation prepared by IDPH for Sauget Area 1. The conclusions and recommendations were based on the conditions and data available at that time. IDPH concluded that Area 1 posed a public health hazard based on chronic exposure to contaminated sediments in Dead Creek. Persons could also be exposed to contaminants near Site G and to groundwater contamination near Dead Creek Segment B. IDPH recommended the remediation of contaminated Dead Creek sediments, remediation of Site G, restricted groundwater use, restricted access to contaminated areas, flood control, and more sampling to better characterize the extent of the contamination. The conclusions and recommendations from the 1995 health consultation can be found in Attachment 1.

### **Demographics**

The population within a 1-mile radius of Area 1 is about 11,400 persons and includes all of Sauget, and small portions of East St. Louis and Cahokia.

### **Site Visit**

IDPH made several site visits, the most recent on August 6, 2002. At that time, contaminated Dead Creek sediments had been remediated. Trees along Dead Creek were removed during the sediment removal, particularly at CS-B. Site G, CS-B, Site M, CS-A and Site I were all fenced.

### **Sampling Activities Since 1995**

Sampling activities that have taken place since the May 8, 1995 health consultation include:

- magnetometer (to detect scrap metal and buried drums) and soil gas surveys of sites G, H, I, L, and N,
- waste samples at Sites G, H, I, L, and N,
- upgradient and down gradient groundwater samples at Sites G, H, I, and L,
- surface water and sediment samples from Creek Segments B, C, D, E, and F, Site M, the Borrow Pit, and the Old Prairie DuPont Creek,

- biological/ecological samples, and
- air samples (1).

Remedial projects have occurred at Site G, Site M, and Creek Segments B through F. A total of 748 samples were collected, not including magnetometer and soil gas samples. In addition, an ecological and a human health risk assessment have been conducted for the site (2,3).

### **On-site Surface Soil**

On-site surface soil samples were collected from Sites G, H, I, L and N. This sampling consisted of four samples at each site collected between 0 and 6 inches in depth. In addition, a composite sample was collected from 0 to 2 feet below the bottom of the fill material. These borings were analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides, total polychlorinated biphenyls (PCBs), inorganic chemicals, and dioxins (expressed as 2,3,7,8-TCDD equivalents). Soil samples were collected from the perimeter of the sites to determine the extent of contamination.

### **Residential and Undeveloped Area Surface Soil Samples**

Surface and subsurface soil samples were collected from 45 residential and undeveloped areas in Sauget and northern Cahokia. Surface samples were collected from the surface to a depth of 0.5 feet, while the subsurface soil samples were collected between 3 and 6 feet in depth. Figure 4 shows the location of the surface soil samples. Surface and subsurface soil samples were analyzed for dioxins, PCBs, inorganics, VOCs, SVOCs, and pesticides. All surface samples and four of the forty-five subsurface samples were analyzed for dioxins and furans.

### **Groundwater**

Groundwater samples were collected from shallow and deep aquifers near the fill areas including Sites G, H, I, and L and residential areas. Eighty-eight groundwater samples were associated with Sites G, H, I, and L. Fifteen groundwater samples were collected from two residential wells and four non-potable domestic wells in the residential areas.

### **Surface Water**

Surface water samples were collected from Dead Creek, Site M, the Borrow Pit Lake, Old Prairie DuPont Creek and four background areas. Three samples were collected at Creek Segments B, D and F for a total of nine samples. One sample was collected from CS-E and another from Site M. Two samples were collected from the Old Prairie DuPont Creek.

## **Sediments**

Sediment samples were collected before and after contaminated sediments were removed. Sediments were collected from Creek Segments B, C, D, E and F, Site M, Reference Area and Old Prairie DuPont Creek before their removal. After the removal action, 106 clearance samples were collected from Creek Segments B, C, D, E, and F, and Site M. PCBs were analyzed in all clearance sediment samples. Not all clearance sediment samples were analyzed for all chemicals.

## **Air Sampling**

Air samples were collected from thirteen locations. Different sampling media were used to collect different chemicals. All air samples were collected over a 24-hour period. Two samples were collected upwind and two samples were collected downwind from Site G. Three upwind and six downwind samples, two at each site, were collected from Sites H, I, and L. The locations of the air samples are shown in Figure 3.

## **Fish**

Seven fish fillet samples were collected from white crappie, white bass, and largemouth bass. The samples were analyzed for PCBs, dioxins and furans, VOCs, SVOCs, inorganic chemicals, and pesticides. All fish fillet samples were collected from the Borrow Pit Lake.

# **Discussion**

## **Chemicals of Interest**

IDPH compared the results of the maximum levels detected in the environmental samples with appropriate screening comparison values to select chemicals for further evaluation for carcinogenic and non-carcinogenic health effects. Chemicals found at levels greater than comparison values or those for which no comparison values exist were selected for further evaluation. A brief explanation of each comparison value used is found in Attachment 2.

## **Soil**

### **On-site Samples**

The chemicals of interest identified in on-site surface soil samples from sites G, H, I, L, and N include dioxins, total PCBs, arsenic, cadmium, lead, thallium, heptachlor epoxide, six polycyclic aromatic hydrocarbons (PAHs), and carbazole (Table 1). Site G surface soil only had arsenic at a level that exceeded the soil comparison value, presumably because clean surface soil was brought onto the site during the 1995 remedial activities.

## **Residential and Undeveloped Soils**

The chemicals of interest in surface and subsurface soil in the residential and undeveloped sections of Area 1 include dioxins, arsenic, thallium, nine PAHs, and two pesticides (Table 2).

## **Groundwater**

Seventy chemicals of interest were identified in the groundwater samples collected from residential wells and groundwater at Sites G, H, I, and L (Table 3). IDPH used drinking water comparison values to select chemicals of interest in groundwater.

## **Surface Water**

Twenty-three chemicals of interest were found in the surface water samples collected from Dead Creek Segments B, D, E, and F, Site M, Old Prairie DuPont Creek, and background reference areas (Table 4). Dioxins are of interest because they were detected in the samples, but they can not be further evaluated since the laboratory detection limit exceeded the comparison value.

## **Sediments**

The chemicals of interest in creek sediments were selected from samples before removal activities (Table 5) and after removal activities (Table 6). All the chemicals of interest identified in the pre-removal sediments were also chemicals of interest in the post removal sediments, but generally at lower levels.

## **Air**

Review of the results of eight downwind and five upwind air samples yielded twenty chemicals of interest (Table 7). The location of the upwind sample at Site I was downwind of Sites G, H, and L. The Site G sample was directly across Queeny Avenue from the upwind sample for Site I. Seven of the twenty samples had higher levels of the chemicals of interest in samples upwind of Area 1. The source of the chemicals in the upwind samples is not known. The selection of these sampling locations makes it difficult to determine the source of the chemicals of interest, but exposure to these chemicals can still be estimated.

## **Fish**

Twelve chemicals of interest were identified in the fish fillets from Borrow Pit Lake including dioxins, five metals, four pesticides, and two phthalates (Table 8).

## **Exposure Analysis**

Exposure to a chemical at a level that exceeds a comparison value does not necessarily mean that adverse health effects will result. The potential for exposed persons to experience adverse health effects depends on:

- ▶ how much of each chemical a person is exposed to,
- ▶ how long a person is exposed, and
- ▶ the health condition of the exposed person.

People can be affected by a chemical only if they contact it through an exposure pathway at a sufficient concentration to cause a toxic effect. This requires a source of exposure, an environmental transport medium, a point of exposure, a route of exposure, and a receptor population. A pathway is complete if all of its components are present and if people were exposed in the past, are currently exposed, or will be exposed in the future. If parts of a pathway are absent, data are insufficient to decide whether it is complete, or exposure may occur at some time (past, present, future), then it is a potential pathway. If part of a pathway is not present and will never exist, the pathway is incomplete and can be eliminated from further consideration. Completed exposure pathways are shown in Table 9 and potential exposure pathways are shown in Table 10. Table 11 shows the population near various Area 1 sites.

### Completed Exposure Pathways

#### Air

Exposures were calculated for the chemicals of interest in air. The benzo(a)pyrene toxicity equivalency factor (TEF) was used for acenaphthylene, fluorene, and fluoranthene and these values were added together to estimate exposure.

Exposure was estimated for a 10-year-old child resident, an adult resident, and an adult worker breathing the chemicals of interest in the air. Exposures were calculated using the upwind and downwind maximum values for each chemical.

Based on the exposure scenarios, dioxins in air may increase the risk of non-cancer adverse health effects over a long period for children and adults residing near Queeny Avenue and workers on these sites and in nearby industries. A moderate increased cancer risk may be associated with exposure to methylene chloride and 1,1-dichloroethene.

#### Creek Sediments

Sample results from 1999 showed that Dead Creek sediments contained elevated levels of dioxins, PCBs and arsenic. Dead Creek Segment B had the highest levels of these chemicals. Segment B is fenced, so exposure to the highest levels of contaminants is not likely. Samples in segments further downstream showed a decrease in the levels of chemicals.

An exposure scenario for a child playing in the creek for 4 days per week, 26 weeks per year for a maximum of five years found that there would be no apparent increased risk of cancer for past exposure to creek sediments.

Remediation of Dead Creek sediments occurred in 2000 and 2001. After remediation, the levels of PCBs and arsenic decreased. Based on the above exposure scenario, exposure to creek sediments would cause no increased risk of cancer. Exposure to dioxins would not be expected to cause adverse health effects if children are exposed over a long period. No other chemicals in creek sediments would be expected to cause adverse health effects.

### **Surface Water**

Surface water samples were collected before the remediation of the creek sediments. Elevated levels of benzene and PCBs were found in the 1999 surface water sampling. Based on the same exposure scenario used for children playing in creek sediments, no increased risk of cancer would be expected. No non-cancer health effects would be expected from exposure to surface water in Dead Creek.

### **Fish**

Sample results for fish are based on sampling that occurred before the remediation of the creek sediments. Elevated levels of dioxins were found in fish from Borrow Pit Lake. To determine whether adverse health effects might occur from fish from Borrow Pit Lake, we used an exposure scenario of children and adults eating 0.25 pounds of fish per week for 26 weeks per year.

Based on the above exposure scenario elevated levels of dioxins may increase the risk of non-cancer adverse health effects over a long period. Arsenic was found in only one of the fish samples. Based on our exposure scenario, no increased risk of cancer would be expected from eating arsenic in fish caught in Borrow Pit Lake. Because of remediation, current levels of contaminants in fish may be less than the values found in the 1999 sampling.

### **Surface Soil**

Forty-five samples were collected in residential and undeveloped areas surrounding the sites. Levels of arsenic, PAHs, and dioxins exceeded comparison values. Based on an exposure scenario of young children playing 5 days per week, 35 weeks per year for a maximum of 5 years, no apparent increased risk of cancer would be expected. No non-cancer health effects would be expected for children exposed to surface soil in these areas.

For adults, an exposure scenario of 5 days per week, 35 weeks per year for 30 years would result in no apparent increased risk of cancer. No non-cancer health effects would be expected for adults exposed to surface soil in these areas.

### **On-site Surface Soil**

Site I is fenced and not accessible to trespassers. Site G was remediated in 1995 and has a cap of 1 to 2 feet of clean soil.



In sites H and L elevated levels of PCBs, PAHs, heptachlor epoxide, and arsenic were found in surface soil samples. An exposure scenario of a young child playing 1 day per week, 18 weeks per year for a maximum of 5 years was used.

Based on this exposure scenario, a child would have no apparent increased risk of cancer from playing in contaminated soil. No non-cancer adverse health effects would be expected from exposure to the on-site surface soil.

## **Potential Exposure Pathways**

### **On-site Contamination**

Exposure to chemicals in on-site soil could occur during remediation or otherwise disturbing subsurface soil, waste, and groundwater. Workers remediating site-related contaminants should wear protective clothing as required by the U.S. Department of Labor.

### **Residential Groundwater**

In residential areas, only one well had an elevated level of PCBs; however, because of a local ordinance, wells are not used as a source of drinking water. All areas are connected to the public water supply.

Industrial areas to the north had elevated levels of several chemicals including VOCs. If this area of contamination moves toward residential areas, their groundwater may be affected in the future.

## **Toxicological Evaluation**

The estimated exposure doses were compared with health guidelines for non-cancer health effects. Cancer risks were estimated for those chemicals that are known or suspected carcinogens. From these estimates, IDPH found an increased risk of non-cancer adverse health effects in children from exposure to dioxins in fish from Borrow Pit Lake. No increased risk of cancer would be expected from exposure to site-related contaminants.

### **Dioxins**

The level of dioxins found in fish was above the minimal risk level (MRL) for children. Exceeding the MRL does not mean that adverse health effects will occur. The MRL for dioxins is based on a study where monkeys were exposed to levels similar to the estimated dose for dioxins in fish based on the 1999 sampling. These monkeys exhibited altered developmental and social behavior when exposed to this level of dioxins. Human studies have not suggested similar developmental effects from exposure to the level of dioxins found in fish from Borrow Pit Lake.

In addition, because the only available fish data were collected before the remediation activities occurred, the level of dioxins in fish may have decreased.

### **1,1-Dichloroethene**

Based on our exposure scenario, breathing 1,1-dichloroethene in ambient air may cause an increased risk of cancer. USEPA has determined that 1,1-dichloroethene is a possible human carcinogen. Studies on workers who breathed 1,1-dichloroethene have not shown an increase in cancer. These studies, however, are not conclusive because of the small numbers of workers and the short time studied. Animal studies have shown mixed results. Several studies reported an increase in tumors in rats and mice, and other studies reported no such effects.

### **Methylene Chloride**

Based on our exposure scenario, breathing methylene chloride in ambient air may cause an increased risk of cancer. Human studies are not conclusive; however, an increased cancer risk was seen in mice breathing large amounts of methylene chloride for a long period.

USEPA has determined that methylene chloride is a probable cancer-causing agent in humans. The World Health Organization has determined that methylene chloride may cause cancer in humans. The Department of Health and Human Services has determined that methylene chloride can be reasonably anticipated to be a cancer-causing chemical.

## **Community Health Concerns**

### **Is exposure to creek sediments going to harm my child?**

Exposure to contaminants in sediment in Dead Creek Segments C, D, E, and F would not be expected to cause adverse health effects in children. Dead Creek Segment B is fenced and not accessible. Currently, exposure to the levels of chemicals in creek sediments would not be expected to cause adverse health effects in children contacting the sediments. Nonetheless, children should be discouraged from playing in the creek because by doing so, they would be unnecessarily exposed to not only chemical contaminants, but to possible bacteriological and viral pathogens.

Before sediment removal in 2001, long-term exposures to sediments in all creek segments may have increased the risk of adverse health effects associated with dioxins and may have posed a low increased risk of cancer due to PCBs.

### **Is the flooding from Dead Creek contaminating our yards?**

Contaminated sediments may have been deposited in yards during past flood events. The contribution of flood water to residential soil contamination is not known; however, no adverse health effects would be expected from exposure to the levels of chemicals detected in residential yards. Now that creek sediments have been remediated, future flooding should not be a concern.

### **Can I use the groundwater to wash my car or water my garden?**

Groundwater should not be used to wash cars or water gardens because groundwater contamination may be present in residential areas. In accordance with local ordinances, groundwater is not to be used as drinking water in either Sauget or Cahokia.

## **Child Health Initiative**

IDPH recognizes that children are especially sensitive to some contaminants. IDPH evaluated children's exposure to contaminants to determine whether adverse health effects would be expected. Based on animal studies, developmental effects could occur in children who routinely eat fish from Borrow Pit Lake that contain elevated levels of dioxins. Parents should follow the proper fish cooking and cleaning guidelines in the Illinois Fishing Information publication from the Department of Natural Resources to reduce exposure to contaminants in fish. No other site-related contaminants would be expected to cause adverse health effects in children.

## **Conclusions**

IDPH concludes that Sauget Sites Area 1, in Sauget, Illinois, poses a public health hazard because long-term exposure to ambient air and eating fish from Borrow Pit Lake could result in adverse health effects. The source of dioxins, 1,1-dichloroethene, and methylene chloride in ambient air is not known. Fish sampling suggests the possibility of developmental health effects in children who routinely eat contaminated fish; however, because the only data available were gathered before remediation of the Borrow Pit Lake sediments, this information may no longer be accurate.

In the past, before remediation of creek sediments and the fencing of some sites, exposure to elevated levels of some contaminants may have occurred. Exposure to site-related chemicals in surface water, unfenced sediments, and soil would not be expected to result in adverse health effects.

## **Recommendations and Public Health Action Plan**

IDPH recommends that:

1. USEPA collect additional air samples near Sites G, H, I, and L to determine if VOC levels are elevated. The source of these chemicals should be determined and proper background samples collected.
2. The responsible parties maintain restricted access to Creek Segment B and Site M.
3. USEPA perform additional fish sampling to determine if the levels of dioxins in fish have decreased since the completion of remediation activities.

## **Preparers of Report**

### **Preparer**

David R. Webb, M.S.  
Environmental Toxicologist  
Illinois Department of Public Health

### **Reviewers**

Jennifer Davis  
Ken Runkle  
Environmental Toxicologists  
Illinois Department of Public Health

### **ATSDR Regional Representative**

Mark Johnson  
Regional Operations  
Office of the Assistant Administrator

### **ATSDR Technical Project Officers**

Allen Robison  
Division of Health Assessment and Consultation

Sylvia Allen-Lewis  
Division of Health Education and Promotion

Steve Inserra  
Division of Health Studies

### **References**

- 1) Engineering Evaluation/Cost Analysis, Remedial Investigation/Feasibility Study, Sauget Area 1, Sauget and Cahokia, Illinois. Roux Associates, Inc., Rev. 1, June 8, 2001.
- 2) Engineering Evaluation/Cost Analysis, Remedial Investigation/Feasibility Study, Volume II, Human Health Risk Assessment, Sauget Area 1, Sauget and Cahokia, Illinois. Part B, ENSR International, Rev. 1, June 8, 2001.
- 3) Ecology and Environment, Inc. DRAFT Remedial Investigation Dead Creek Project Sites at Cahokia/Sauget, Illinois. Volumes 1 & 2. March 1988.
- 4) United States Environmental Protection Agency. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, Office of Research and Development, Washington, D.C., 1993.
- 5) Agency for Toxic Substances and Disease Registry. Public Health Assessment Guidance Manual. Atlanta, Ga., 1992.

Sauget Area 1, Dead Creek

Initial Release

## **Tables**